



## Adaptations to climate in candidate genes for common metabolic disorders

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### Abstract:

Evolutionary pressures due to variation in climate play an important role in shaping phenotypic variation among and within species and have been shown to influence variation in phenotypes such as body shape and size among humans. Genes involved in energy metabolism are likely to be central to heat and cold tolerance. To test the hypothesis that climate shaped variation in metabolism genes in humans, we used a bioinformatics approach based on network theory to select 82 candidate genes for common metabolic disorders. We genotyped 873 tag SNPs in these genes in 54 worldwide populations (including the 52 in the Human Genome Diversity Project panel) and found correlations with climate variables using rank correlation analysis and a newly developed method termed Bayesian geographic analysis. In addition, we genotyped 210 carefully matched control SNPs to provide an empirical null distribution for spatial patterns of allele frequency due to population history alone. For nearly all climate variables, we found an excess of genic SNPs in the tail of the distributions of the test statistics compared to the control SNPs, implying that metabolic genes as a group show signals of spatially varying selection. Among our strongest signals were several SNPs (e.g., LEPR R109K, FABP2 A54T) that had previously been associated with phenotypes directly related to cold tolerance. Since variation in climate may be correlated with other aspects of environmental variation, it is possible that some of the signals that we detected reflect selective pressures other than climate. Nevertheless, our results are consistent with the idea that climate has been an important selective pressure acting on candidate genes for common metabolic disorders.

**Source:** <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2242814>

### Resource Description

#### Exposure :

weather or climate related pathway by which climate change affects health

Meteorological Factors, Precipitation, Solar Radiation, Temperature, Other Exposure

#### Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

#### Geographic Location:

resource focuses on specific location

# Climate Change and Human Health Literature Portal

Global or Unspecified

## **Health Impact:**

specification of health effect or disease related to climate change exposure

Other Health Impact

**Other Health Impact:** Variation in metabolism genes

## **Mitigation/Adaptation:**

mitigation or adaptation strategy is a focus of resource

Adaptation

## **Resource Type:**

format or standard characteristic of resource

Research Article

## **Timescale:**

time period studied

Time Scale Unspecified

## **Vulnerability/Impact Assessment:**

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content